Teacher Guide

Courseware Solutions Inc.

Mathville™ Waterway

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Courseware Solutions Inc.

Janis Gershman
Mary Pat McDonald
Evannah Sakamoto

Graphics: Rob MacIntyre
Voice: Marcella Hope

www.mathville.com

Phone & fax: 1-888-MATHVILLE

e-mail: marypat@mathville.com

Getting started

Insert the CD-ROM into the CD-ROM drive.

Windows 3.x

a) Using the File Manager, click the CD-ROM drive icon.

b) Double-click *water3.exe* to start.

Windows 95

a) Choose *My Computer*.

b) Choose the CD-ROM drive icon.

c) Double-click the *Waterway* icon to start.

Macintosh

a) Double-click the *Waterway CD* icon to show the contents of the CD-ROM.

b) Double-click the *Waterway - Power Mac* or *Waterway - Mac* icon to start.

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Overview

Mathville Waterway is part of the *Mathville*™ series of educational software, which is based upon the belief that EVERY student can enjoy developing and demonstrating their mathematical literacy within a supportive, mathematically rich environment.

The *Mathville* series is used in thousands of schools and is recommended by many departments and boards of education. The programs are designed in accordance with the standards developed by the National Council of Teachers of Mathematics and adhere to the curriculum guidelines of many North American educational jurisdictions.

Structure & content

Waterway is a virtual aquatic environment where children can discover a wide variety of highly motivating math activities. It is a non-linear, non-hierarchical program, and children are free to start or leave any of the activities at any time. Each activity requires the student to use specific math and problem-solving skills. The skills required are listed in the table on pages 4 and 5. The educational objectives associated with each activity are described beginning on page 10.

Suggested grade range

The topics in *Waterway* are often introduced in grade 5 classrooms. Due to its structure, which allows children to freely explore a wide variety of activities and math skills, the program may be used in grades 4 to 6 and may be enjoyed by younger children as well.

Recommendations for use

Most children readily begin exploring *Waterway* on their own, require little supervision and enjoy playing for a full class period or more. The pro-

gram is designed to be used independently by students and does not require close adult supervision. Careful observation of a student's interactions with the program can reveal a great deal to the teacher about a student's problem-solving abilities, understanding of concepts and ability to apply skills in new situations.

Waterway is appropriate for use at any point during the school year and may be used as:

- a highly motivating way to reinforce and provide additional practice in math skills introduced in class
- a means of providing a wider variety of applications of math skills and concepts
- a source of assessment information about a student's problem-solving methods and styles and a diagnostic tool to determine areas of difficulty
- an enrichment activity for children who excel in math

Having pairs of students use the program works well, creating a setting which encourages the development of communication skills and co-operative problem solving.

Tracking student progress

Each *Waterway* activity includes an optional printable record of achievement. Printing and saving these certificates provides a "paper track" of individual student progress. These certificates are also excellent additions to a student's math portfolio. Records of achievement printed out over time can be used to determine improvement during the term and provide evidence that students have demonstrated the learning outcomes associated with each activity.

System Requirements

Waterway is a dual-platform multimedia CD-ROM program that runs on a Windows PC or a Macintosh with the following minimum requirements:

Multimedia PC

- 486 or Pentium
- 8 MB RAM
- Windows 3.x or 95
- SVGA 640 x 480, 256-color monitor
- CD-ROM drive
- Sound card
- Printer recommended

Macintosh

- System 7
- 8 MB RAM
- 640 x 480 color monitor
- CD-ROM drive
- Printer recommended

Copying to a hard drive

Waterway was developed to run directly from the CD-ROM. However, if you wish to copy it to a hard drive and run it, the following files and folders, which require about 20 MB, should be copied:

Windows 95

- *Waterway.exe*
- *DATA* folder

Windows 3.x

- *Water3.exe*
- *DATA* folder/directory

Macintosh

- *Waterway - Power Mac* or *Waterway - Mac*
- *Data* folder

Curriculum Connections

Number Sense & Numeration

Decimal addition & subtraction . . . . . *Crossnumbers*
Decimal concepts . . . . . *Dolphins & Decimals*
. . . . . *Number Diver*
Decimal multiplication & division . . . . . *Crossnumbers*
. . . . . *Dolphins & Decimals*
Fractions . . . . . *Dolphins & Decimals*
. . . . . *Fish Race*
. . . . . *Fraction Fish*
Mental math . . . . . *Dolphins & Decimals*
. . . . . *Multipli-Ski*
Mixed numbers & improper fractions . . . . . *Fraction Fish*
Number facts . . . . . *Multipli-Ski*
Number lines . . . . . *Fishprints*
. . . . . *Number Diver*
Place value . . . . . *Crossnumbers*
. . . . . *Dolphins & Decimals*
. . . . . *Number Diver*
. . . . . *Shell Game*
Relating decimals & fractions . . . . . *Dolphins & Decimals*
Whole number addition & subtraction . . . . . *Crossnumbers*
Whole number multiplication & division . . . . . *Crossnumbers*
. . . . . *Dolphins & Decimals*
. . . . . *Multipli-Ski*

Geometry & Spatial Sense

Angles . . . . . *Wave Watch*
Congruence . . . . . *Wave Watch*
Coordinate system . . . . . *Fraction Fish*

Flips . . . . . *Power Flipper Puzzle*
Ordered pairs . . . . . *Fraction Fish*
Polygons (two-dimensional shapes) . . . . . *Wave Watch*
Polyhedra (three-dimensional shapes) . . . . . *Wave Watch*
Slides . . . . . *Power Flipper Puzzle*
. . . . . *Surf &Turn*
Symmetry . . . . . *Wave Watch*
Turns . . . . . *Surf &Turn*

Measurement

Appropriate units of length & mass . . . . . *Second Guess*
Area (estimation) . . . . . *Fishprints*
Area (measuring with a grid) . . . . . *Fishprints*
Metric prefixes & conversions . . . . . *Second Guess*
Money . . . . . *Fish Race*
Reading an analog clock . . . . . *Second Guess*
Time . . . . . *Second Guess*
Units & concepts of perimeter, area & volume . . . . . *Second Guess*

Patterns & Relations

Extending number patterns . . . . . *Shell Game*
Finding a missing factor in a multiplication . . . . . *Multipli-Ski*
Identifying rules for number relationships . . . . . *Shell Game*
Recognizing patterns in graphs & tables of values . . . *Fish Race*

Data Management & Probability

Bar graphs & tables of values . . . . . *Fish Race*
Chance . . . . . *Fish Race*
Probability concepts & experiments . . . . . *Fish Race*

Problem Solving

Throughout the program but especially in *Fish Race* & *Number Diver*.

Quick Tour

- To play a *Waterway* game, click one of the aquatic icons, for example, one of the fish that swims by or the castle or anemone in the right corner. Each game's icon is shown on the following pages.
- To return to this main screen, click the *Return to Waterway* button in each game.
- The three rectangular buttons in the upper left corner of the screen are:
    - *Quit* – to exit from the program *Waterway*
    - *Credits* – to see a list of the creators of *Waterway* along with telephone, fax, email and postal addresses

    - *Sound* – to display the slider control that adjusts the sound volume. Click in the upper corner to close the display.

- During the individual activities or games, a *Help* button is added to the *Quit, Sound* and *Return to Waterway* buttons. Clicking the *Help* button results in an audio message intended to supplement the visual instructions.
- Starting the program is a straightforward process that many computer-literate students could handle on their own, perhaps following a teacher demonstration or the posted "Getting started" instructions (see the first page of this manual). Since the program runs straight from the CD-ROM, there is no danger of causing accidental damage to the program or any other program on the computer.
- When done with the program click *Quit* and eject the CD-ROM. There is no need to "uninstall" since nothing is ever put on the hard drive.
- Students generally discover a lot about *Waterway* by following their natural inclinations to explore. Encourage children to answer their own "What do I do next?" or "How do I…"-type questions by looking at the screen and experimenting.
- Having pairs of students work together on the program works well, providing a setting for cooperative problem-solving. One way of doing this is to set up a computer running *Waterway* in a resource or math lab area.
- Asking students to explain and compare the strategies they used for games such as *Number Diver* or *Fish Race* provides an opportunity to assess both communication and problem-solving skills.
- If a printer is available, you may wish to ask students to click the *Print* button that appears when each activity is completed and save the printouts as a way of tracking their achievements in the program.
- Short descriptions of the twelve individual games follow on the next two pages. Sample screens and more detailed descriptions of the math skills required by each game begin on page 10.

Crossnumbers

Solve a crossnumber puzzle involving whole number and decimal number arithmetic. The crossnumber clues and special hints are revealed by clicking on the aquatic animals that randomly float by.

Dolphins & Decimals

Use a knowledge of number equivalence to make "equivalent" dolphins splash & dive. Begin with whole numbers in Round 1 and advance to more difficult decimal numbers in Level 5.

Fishprints

In only 20 seconds and with a maximum of 3 attempts, watch a fishprint (a fish "footprint") on a grid come to life by giving a reasonable estimate of the fishprint's area.

Fish Race

The results of a hidden spinner are displayed on a graph "race" & table of values. Analyze the data, look for patterns and use probability concepts to guess what the hidden spinner looks like.

Fraction Fish

Use ordered pairs on a coordinate grid to guide your fish safely through a treacherous reef and collect fraction pieces. Dangers and fraction skills increase through 7 levels of play.

Multipli-Ski

Ready recall of multiplication facts through 12 x 12 keeps a water skiing stunt team right on course. In the Bonus Round, quick recall of division facts and an understanding of factors come into play.

Number Diver

In this search for treasures hidden beneath marks on a number line, understanding decimal place value is as important as your scuba gear! Helpful dolphins will give all the clues you need, if you have a logical search plan.

Power Flipper Puzzle

Reassemble the congruent right triangle pieces of this puzzle with transformations like horizontal and vertical flips, and then watch the power skiers leap into action across the waves.

Second Guess

Keep one eye on your internal clock while piling up points with your knowledge of metric measures and analog clocks. Earn bonus points for accurately estimating 30 and 60 second time intervals.

Shell Game

Guess the number hidden under the shells by identifying and extending number patterns. Sharp guessers who make it to the Expert round must pick the rule used to generate the hidden numbers.

Surf & Turn

Use slides and turns to solve this randomly scrambled geometric puzzle. You'll need to visualize ahead to put everything in place and then see the surfers slide and turn.

Wave Watch

Collect as many items on the beach as possible before the items are washed away by the waves. Know your geometry, think fast and watch the waves to earn maximum points.

Crossnumbers

Program icon

Math skills

Multiply and divide decimal numbers and whole numbers by 10 and 100

Add and subtract whole numbers and decimals numbers to hundredths

Demonstrate understanding of the place value of whole numbers and decimals from 0.01 to 100 000

Dolphins & Decimals

Program icon

Math skills

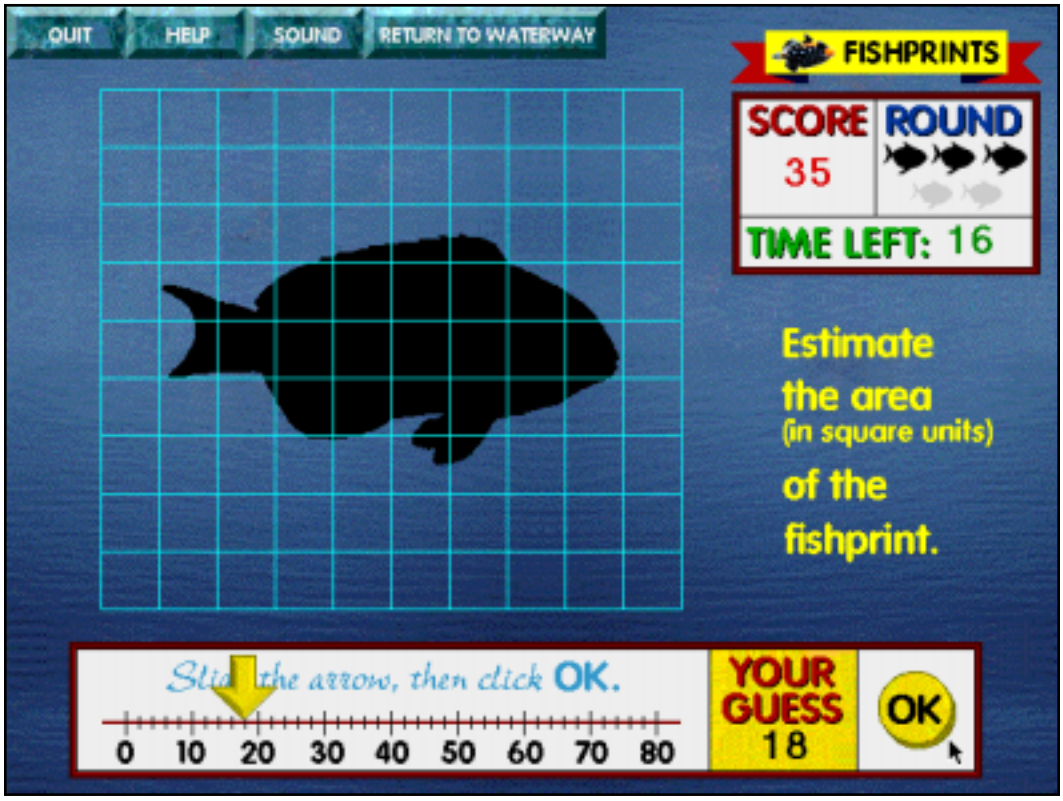
Multiply and divide decimal numbers and whole numbers by 10 and 100

Relate a fraction with a denominator of 10 or 100 to a decimal

Demonstrate the equivalence of decimals and fractions with denominators of 10 and 100

Multiply whole numbers by 0.1 and 0.01

Fishprints



Program icon

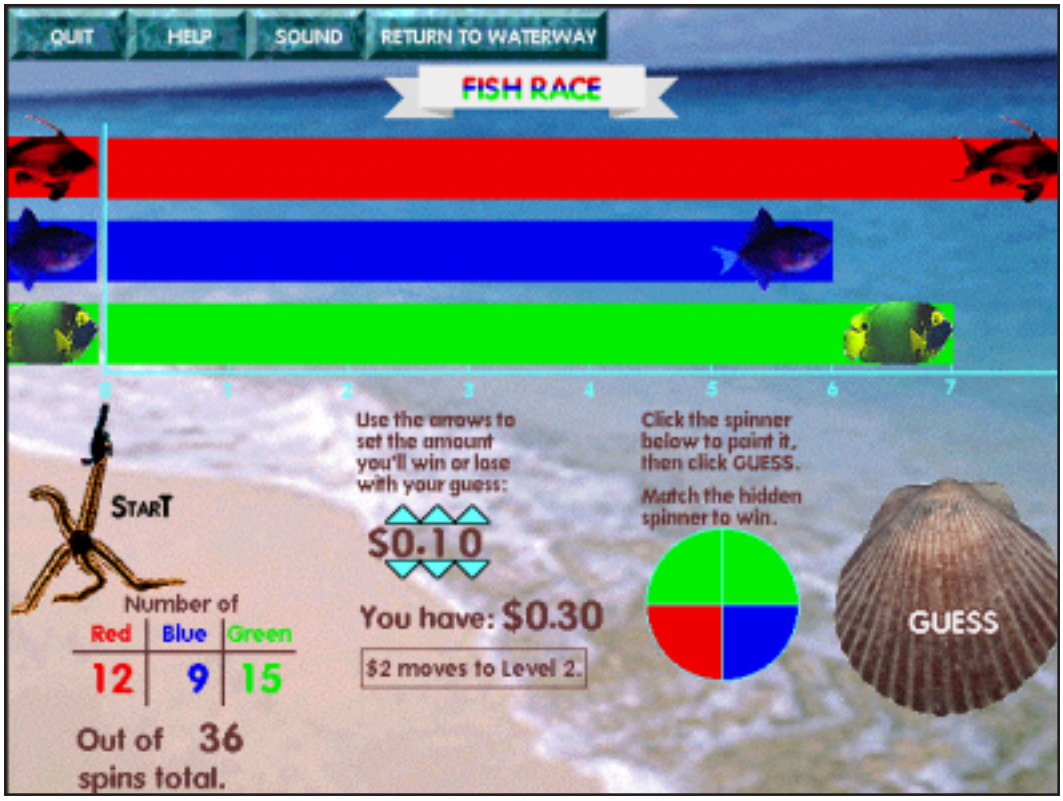
Math skills

Estimate and develop methods to determine the area of irregular polygons

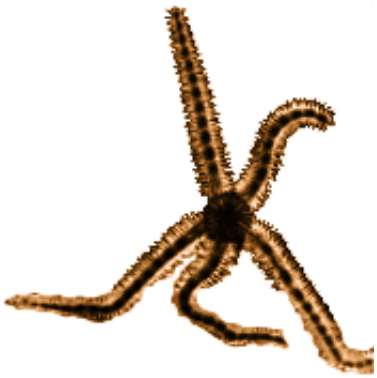
Measure area using a grid

Identify numbers on a number line

Fish Race



Program icon



Math skills

Conduct simple probability experiments

Evaluate data presented in tables & graphs

Use knowledge of probability to solve problems and make relevant decisions

Investigate patterns involving fractions

Use patterns in tables of values and graphs to make predictions

Read & write money values

Fraction Fish

Program icon

Math skills

Represent & compare mixed numbers, proper and improper fractions with simple denominators using diagrams and symbols

Demonstrate equivalence of fractions

Demonstrate an understanding of coordinate systems

Identify a point in the first quadrant using ordered pairs

Multipli-Ski

Program icon

Math skills

Recall multiplication & division facts to 144

Determine the value of a missing factor in a multiplication statement

Demonstrate an understanding of place value in writing whole numbers to 999

Number Diver

Program icon

Math skills

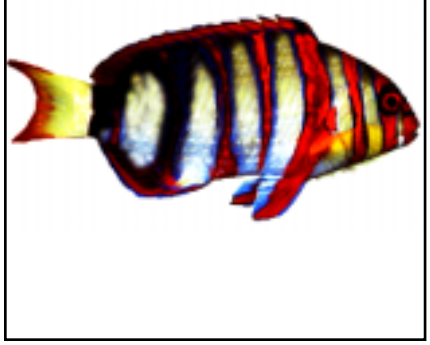
Compare, order and represent the place value of whole numbers and decimals from 0.01 to 100 using a number line

Demonstrate an understanding of place value in writing decimal numbers from 0.01 to 99.99

Power Flipper Puzzle

QUIT
HELP
SOUND
RETURN TO WATERWAY
POWER FLIPPER PUZZLE
Drag the puzzle pieces into this area to create the original picture.
To flip a piece, FIRST click it, then click one of the levers above.

Program icon



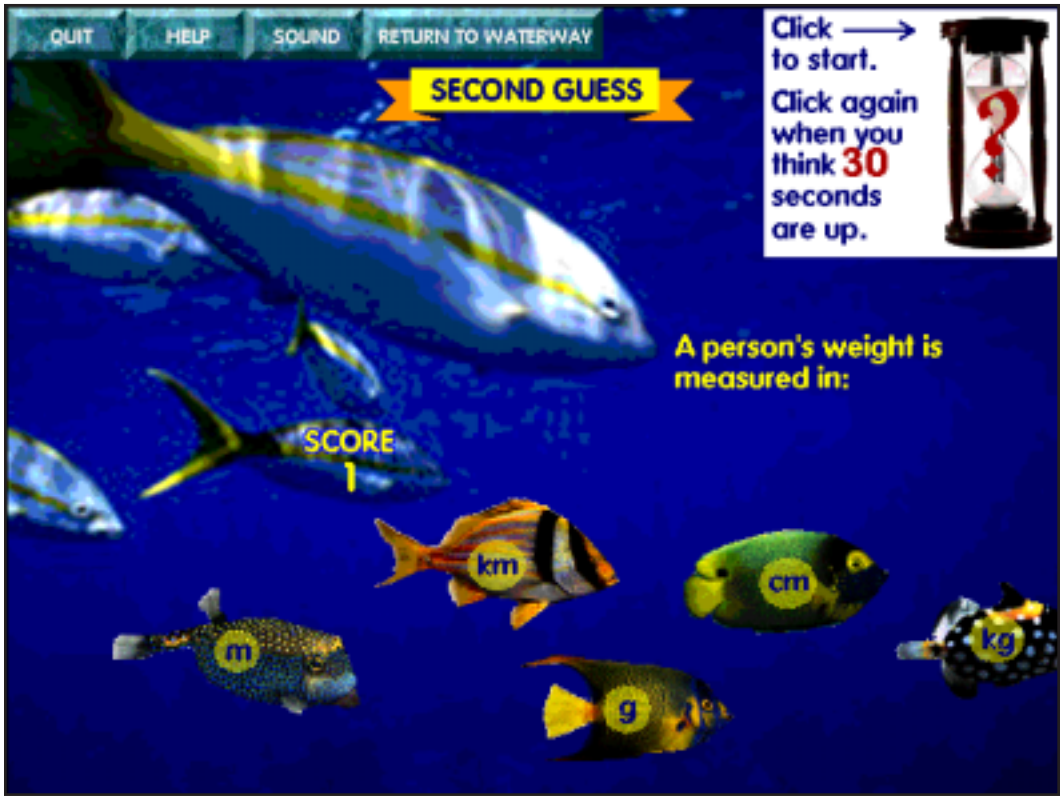
Math skills

Apply reflections to solve problems

Solve two-dimensional geometric puzzles involving reflections

Explore tiling patterns that cover a plane

Second Guess



Program icon

Math skills

Estimate time intervals to the nearest second

Use metric prefixes correctly and convert between standard units of length or mass

Select appropriate standard units to measure length and mass

Read an analog clock to the nearest minute

Distinguish perimeter, area and volume and select appropriate units of measure

Shell Game

Program icon

Math skills

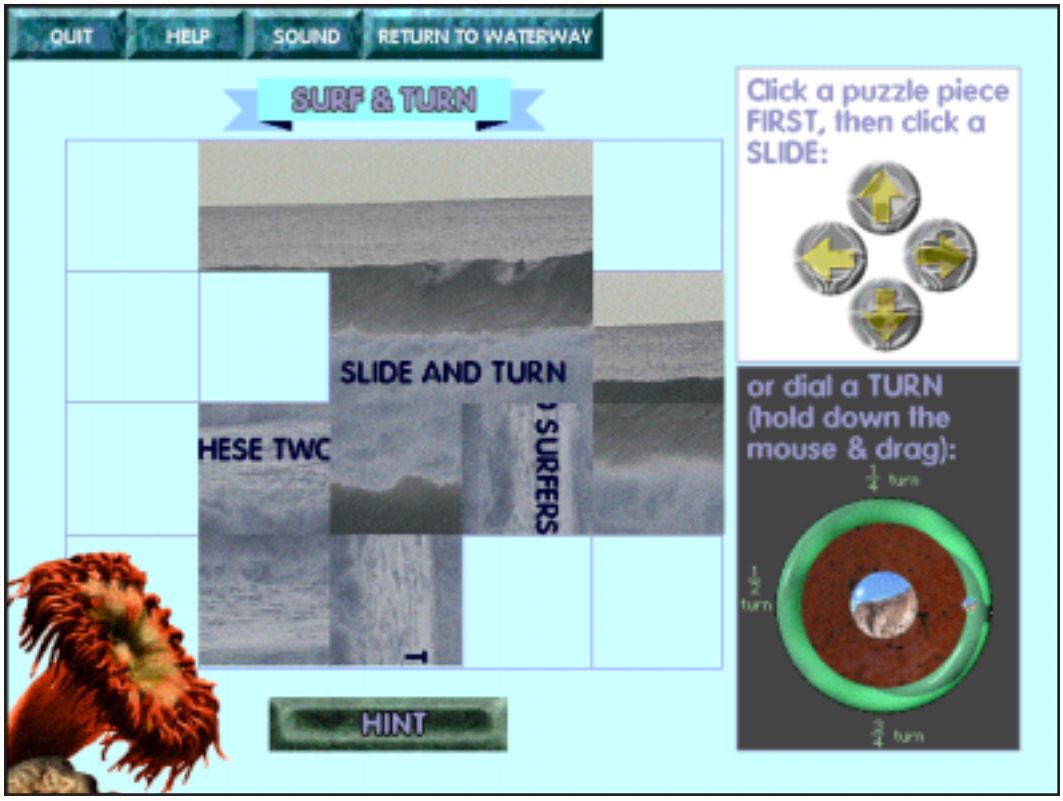
Recognize the relationship between the position of a term in a sequence and its value

Identify & extend patterns

Analyze number patterns & identify the rule for any relationships

Demonstrate an understanding of place value by writing whole numbers to 99.

Surf & Turn



Program icon

Math skills

Apply translations & rotations to solve problems

Solve two-dimensional geometric puzzles involving translations & rotations

Explore tiling patterns that cover a plane

Wave Watch

Program icon

Math skills

Classify 2-dimensional shapes according to angle and side properties

Demonstrate an understanding of congruency and symmetry

Recognize the occurrence of geometric properties in the everyday world

Identify 3-dimensional shapes according to the number and nature of the faces, edges and vertices

Troubleshooting – Macintosh

Problem	*Possible Cause*	*Possible Solution*
PERFORMANCE		
Nothing happens	• wrong *Waterway* program	• For Power Macs, double-click *Waterway - Power Mac* For all other Macs, double-click *Waterway - Mac*
Program seems slow Program freezes	• not enough memory (at least 8 MB is required) • memory management confusion	• Don't run other programs while running *Waterway* • Turn OFF background printing • Close all windows in the Finder • Through the Control Panel (Memory), turn OFF modern memory or 32-bit addressing
PRINTING		
Page doesn't print	• printer driver not installed or active • printer not properly connected • printer not selected under *Chooser*	• Refer to your printer and computer manuals
Printing is slow	• slow processor	• Don't use *Waterway* while the printing is processing

Troubleshooting – Windows

Problem	*Possible Cause*	*Possible Solution*
PERFORMANCE		
Nothing happens	• wrong *Waterway* program	• For Windows 3.x, double-click *Water3.exe* For Windows 95, double-click the *Waterway* icon
Program seems slow Program freezes	• not enough memory (at least 8 MB is required)	• Don't run other programs while running *Waterway*
General Protection Fault error	• memory management error	• Exit Windows and restart the computer • Run SCANDISK to detect and fix any memory location errors
Display is acting odd (fading, etc.) Some text on the screen seems too large	• monitor display may be set incorrectly	• Through Windows Setup, set your display to Super VGA 640 x 480 256 colors • Choose small fonts instead of large fonts in display set up
PRINTING		
Page doesn't print	• printer driver not installed or active • printer not properly connected • printer not selected under Print Manager	• Refer to your printer and Windows manuals
Printing is slow	• slow processor	• Don't use *Waterway* while the printing is processing